

FISHERIES MANAGEMENT PLAN  
for  
Mountain Lakes in East Rosebud Creek Drainage  
Montana

Patrick E. Marcuson (1980)  
Michiel D. Poore (1991)  
Department of Fish, Wildlife and Parks

## Introduction

### Absaroka-Beartooth Wilderness Lakes

The Absaroka-Beartooth Wilderness Area (A-B) established in 1978 encompasses 930,584 acres and contains more area over 10,000 feet in elevation than any other area in the U.S. It rates as one of the top four or five wilderness areas in the country, receiving about 320,000 visitor-days of use each year. For comparison, the Bob Marshall Wilderness area receives about 150,000 visitor-days use yearly. The Absarokee Beartooth Wilderness Area and lands immediately adjacent contain 948 high mountain lakes, 318 of which contain fish and 630 that are barren. Approximately 204 of these lakes have self-sustaining fisheries and 114 are stocked. Stocking schedules vary from early in some of the more heavily used areas to once every six to ten years in the lakes managed for trophy fisheries.

Pat Marcuson, during the time he worked for the Montana Department of Fish, Wildlife and Parks (MDFWP) out of Red Lodge, gathered a tremendous amount of information on the A-B lakes and created a massive data base. In 1980 he developed fisheries management plans for each major drainage. Since that time, a computer data base containing the latest information on the lakes with fisheries has also been developed. This data base is located at the MDFWP Regional Headquarters in Billings. Additional information about individual lakes can be obtained from that office.

The purpose of this document is to update the 1980 lake management plan with the latest fisheries information available for the mountain lakes in the East Rosebud Drainage.

## Methods

Mountain lake information is collected primarily by a lake survey team consisting of two temporary employees who spend about eight weeks backpacking into the remote lakes of the A-B mountains. Lakes scheduled for sampling are selected based on length of time since last survey, questions about the status of fish introductions, impending scheduled fish plants, and angler reports. Fish populations are monitored with lightweight experimental nylon gill nets, hook and line, and visual surveys. Additional information gathered includes lake access, pH, air and surface water temperatures, availability of firewood and campsites, and extent of recreation use. Observations are also made of aquatic invertebrates, cruising and rising fish, fish fry, and suitability of substrate for spawning. Inlet and outlet streams are visually surveyed for fish and spawning activity or potential.

Fish collected are weighted and measured, and scales are taken for later age determination. Live fish are released, dead fish are dissected to check for parasites and general health and condition; stomachs are examined for food organisms.

Spot creel checks are conducted by enforcement and fisheries personnel to determine catch rates and angler satisfaction with regulations. Additional angler use information was gathered during 1988 and 1989 with a voluntary trailhead creel information survey implemented at the major access points to the A-B wilderness area. The purpose of this survey was to address a proposed new three-fish limit, estimate harvest and catch rates, solicit public comments, and gather additional fisheries information. Supplemental fisheries information is also obtained from guides and outfitters, Wilderness Rangers and other Forest Service personnel, as well as reports from other Wilderness users.

Information gathered from all sources is summarized and analyzed to make fish management decisions for the mountain lakes. Regulations are adjusted as necessary to help achieve desired fish population levels. Stocking rates and individual lake management strategies are adjusted as necessary to maintain desired angler catch rates, fish growth rates, and species distribution. Summarized information is used to update the computer data base for each mountain lake sampled.

## DESCRIPTION

### Location and number of lakes

East Rosebud Creek drains a portion of the north side of the Beartooth Mountain Range between Rock Creek to the east and West Rosebud Creek to the west. East Rosebud Creek drains 182.1 square miles of which 108.8 square miles are within the Custer National Forest boundary. Roscoe, Montana is the closest town to most of the lakes in the drainage.

All the lakes are in the Custer National Forest and have public egress except for a large portion of shoreline at East Rosebud Lake. The drainage has 76 lakes, 10 of which are part of East Rosebud Creek. All others flow into East Rosebud from nine tributary streams (Figure 1). Lakes cover 1.9 percent of the total drainage area in the Custer National Forest.

The majority of the lakes (61) are in Carbon County, five are in Stillwater, nine are on the Carbon-Park county line, and one is shared by Stillwater and Carbon counties. All lakes are in Townships 7 and 8 and Ranges 15, 16, and 17. East Rosebud Lake is the only lake in the drainage outside the Absaroka-Beartooth Wilderness.

### Lake areas and depths

The 76 lakes cover 1,333 surface acres ranging from less than 1 acre to the largest, Fossil Lake at 168.8 acres (Table 1). Besides Fossil, two other lakes, East Rosebud and Cairn, exceed 100 acres. Turgulse has 82.9 acres, Froze to Death has 74.5, and Rainbow covers 58 acres. Nine lakes are in the range of 25-49 acres, 10 fall into the 10-24 acre class, and the remaining 51 lakes are less than 10 acres.

Maximum depths of each lake (Table 1) vary from 1 foot to 202 feet, the deepest being Alice Lake (#17 Figure 2) on upper Falls Creek. Those lakes exceeding 100 feet are: Froze to Death, 195 ft; Rainbow, 180 ft; Fossil, 150 ft; Cairn, 125 ft; Summit, 116 ft; Upper Arch, 112 ft; Martin, 108 ft; and Upper Granite Creek Lake at 105 ft.

### Lake elevations

The lakes occupy elevations from 6,208 ft at East Rosebud Lake to Upper Granite Creek Lake at 10,300 ft. Those lakes occupying elevations 9,000 to 10,300 ft comprise 83 percent of the lakes in the drainage. Waters were judged to occupy the four ecological zones as follows: 5 lakes were in the Transition Zone, 9 were in the Canadian, 36 were Sub-alpine, and 26 were in the Alpine Zone.

East Rosebud Creek Drainage map.

Table 1. Summary of locations, physical features and fisheries information for lakes in the East Rosebud Creek Drainage of the Beartooth Mountain Range.

Location code <sup>1</sup>	Name of lake	County <sup>2</sup>	Forest <sup>3</sup>	Elevation in feet	Area in acres	Maximum depth in feet	Shoal (% of lake less than 15 ft. deep) <sup>4</sup>	Ecological zone <sup>4</sup>	Fish Species <sup>5</sup>	Fish population type <sup>6</sup>	Fish management <sup>7</sup>
HELLROARING CREEK											
1	Crow	10	C	9,064	11.2	72	10	3	EB	1	1
2	Sylvan	10	C	9,153	18.5	40	33	3	GT	1	1
EAST ROSEBUD CREEK											
3	East Rosebud	10	C-P	6,208	111.7	20	61	1	LS	1	1
									WS	1	1
									LL	1	2
									CT	3	1
									MW	1	1
									EB	3	1
									RB	1	
SNOW CREEK											
4	Snow (Lower)	10	C	9,160	8.0	53	30	3	RB	2a	6
5	Upper Snow	10	C	9,265	10.4	25	25	3	RB	2	2
5a	Unnamed	10	C	10,240	0.9	12	100	4	B		3
EAST ROSEBUD CREEK											
5b	Unnamed	10	C	9,550	0.8	4	100	3	B		3
6	Elk	10	C	6,780	7.3	6	100	1	EB	1	1
7	Rimrock	10	C	7,540	33.6	25	43	2	H <sub>1</sub>	1	1
8	Rainbow	10	C	7,670	58.0	180	8	2	H <sub>1</sub>	1	1

Table 1. Summary of locations, physical features and fisheries information for lakes in the East Rosebud Creek Drainage of the Beartooth Mountain Range.

Location code <sup>1</sup>	Name of lake	County <sup>2</sup>	Forest <sup>3</sup>	Elevation in feet	Area in acres	Maximum depth in feet	Shoal (% of lake less than 15 ft. deep)	Ecological zone <sup>4</sup>	Fish Species <sup>5</sup>	Fish population type <sup>6</sup>	Fish management <sup>7</sup>
WHIRLPOOL CREEK											
9	Elephant	10	C	9,445	14.8	14	100	3	B	1	
10	Bowback	10	C	10,115	5.5	3	100	4	B	3	
11	Summit	10	C	9,606	19.1	116	21	4	B	1	
EAST ROSEBUD CREEK											
12	Lake at Falls	10	C	8,100	49.8	50	21	2	GT	1	1
									CT	1	1
									H <sub>2</sub>	1	1
FALLS CREEK											
13	Martin	10	C	9,260	30.0	108	20	3	B	7	
14	Scat	10	C	9,310	7.0	45	43	3	B	7	
15	Little Scat	10	C	9,330	5.0	3	100	3	B	6	
16	Falls Creek	10	C	9,980	3.8	42	28	4	B	3	
17	Alice	10	C	10,070	39.5	202	24	4	B	1	
18	Boot	10	C	10,140	27.7	62	61	4	B	1	
EAST ROSEBUD CREEK											
19	Big Park	10	C	8,276	7.8	3	100	2	GT	1	1
									CT	1	1
									H <sub>2</sub>	1	1
20	Rosebud	10	C	9,280	30.7	63	24	4	B	1	

Table 1. Summary of locations, physical features and fisheries information for lakes in the East Rosebud Creek Drainage of the Beartooth Mountain Range.

Location code <sup>1</sup>	Name of lake	County <sup>2</sup>	Forest <sup>3</sup>	Elevation in feet	Area in acres	Maximum depth in feet	Shoal (% of lake less than 15 ft. deep)	Ecological zone <sup>4</sup>	Fish Species <sup>5</sup>	Fish population type <sup>6</sup>	Fish management <sup>7</sup>
21	Duggan	10	C	8,840	4.4	10	100	2	CT GT H <sub>2</sub>	1 1 1	1 1 1
22	Twin Outlets	10	C	9,190	29.5	50	75	3	GT CT H <sub>2</sub>	1 1 1	1 1 1
23	Dewey	10	C	9,340	37.2	95	17	3	CT	2	6
24	Snowbank	10	C	10,200	6.9	33		4	B		1
25	Fossil	10	C	9,900	164.7	150+	14	4	CT	2	2
25a	Unnamed	10	C	10,100	1.8	15	100	4	B		7
26	Unnamed	10	C	10,120	3.9	18	63	4	B		1
27	Unnamed (2)	10-49	C	10,200	6.5 .3	14 5	100 100	4 4	B B		1 3
CAIRN CREEK											
28	Oly	10	C	9,620	2.5	18	95	3	B		7
29	Unnamed (6)	10-49	C	10,250	11.6t	15	100	4	B B		3 1
30	Billy	10	C	10,150	10.5	57	53	4	B		7
31	Cairn	10-49	C	10,186	148.3	125	18	4	EB	1	4
32	Unnamed (12)	10	C	10,160	11.8t	22		3	B		3



Table 1. Summary of locations, physical features and fisheries information for lakes in the East Rosebud Creek Drainage of the Beartooth Mountain Range.

Location code <sup>1</sup>	Name of lake	County <sup>2</sup>	Forest <sup>3</sup>	Elevation in feet	Area in acres	Maximum depth in feet	Shoal (% of lake less than 15 ft. deep)	Ecological zone <sup>4</sup>	Fish Species <sup>5</sup>	Fish population type <sup>6</sup>	Fish management <sup>7</sup>
33	MEDICINE CREEK Medicine	10	C	9,906	30.3	127	25	3	CT	2	2
34	EAST ROSEBUD CREEK Unnamed	10	C	9,920	0.7	10	100	3	B		3
35	Unnamed	10	C	9,910	3.1	15	100	3	B		3
36a	Unnamed	10	C	10,050	3.1	4	100	3	B		3
b				10,200	2.3	5	100	3	B		3
c				9,740	.7	1	100	3	B		3
d				8,360	1.0	11	100	3	B		3
37	GRANITE CREEK Echo	10	C	8,486	12.2	21	56	2	CT	1	1
38	Unnamed	10	C	9,430	3.1	3	100	3	B		1
39	Granite Creek (Upper)	10	C	10,300	23.1	105	27	4	B		1
40	Granite Creek (Lower)	10	C	10,070	14.9	82	18	4	B		1
41	ARCH CREEK Lower Arch	10	C	9,580	24.3	95	22	2	CT	1a	1
42	Upper Arch	10	C	10,120	46.9	112	26	3	CT	2	2
42a	Unnamed Arch	10	C	10,340	7.9	12	100	3	B		3
43	Arch	32	C	10,120	6.5	54	30	3	CT	2	2

Table 1. Summary of locations, physical features and fisheries information for lakes in the East Rosebud Creek Drainage of the Beartooth Mountain Range.

Location code <sup>1</sup>	Name of lake	County <sup>2</sup>	Forest <sup>3</sup>	Elevation in feet	Area in acres	Maximum depth in feet	Shoal (% of lake less than 15 ft. deep)	Ecological zone <sup>4</sup>	Fish Species <sup>5</sup>	Fish population type <sup>6</sup>	Fish management <sup>7</sup>
ARMSTRONG CREEK											
44	Shadow	10	C	8,400	5.4	19	80	2	EB	1	1
45	Lost	10-32	C	9,160	3.5	36	25	2	GR CT	2a 1	6 1
46	Slough (3)	10	C	7,520	5.8t	9	100	1	EB	1	1
47	Phantom	32	C	9,320	19.5	56	41	3	CT	1	1
48	Froze to Death	32	C	10,156	74.5	195	21	4	CT	1	1
49	Turgulse	32	C	10,206	82.9	80	36	4	CT	2	2
50	Brent	32	C	10,216	13.3	75	18	4	B		1

<sup>1</sup> See Figure 1 for locations.

<sup>2</sup> 10 = Carbon; 10-49 = Carbon & Park; 32 = Stillwater; 10-32 = Carbon & Stillwater.

<sup>3</sup> C = Custer National Forest; S = Shoshone National Forest; P = Private.

<sup>4</sup> 1 = Transition; 2 = Canadian; 3 = Subalpine; 4 = Alpine.

<sup>5</sup> CT = Cutthroat trout; RB = Rainbow trout; GR = Arctic grayling; GT = Golden trout; EB = Brook trout; LL = Brown trout; B = Barren of fish; H<sub>1</sub> = RBxGT (rainbow x golden); H<sub>2</sub> = CTxGT (cutthroat x golden); MW = Mountain whitefish; WS = White sucker; LS = Longnose sucker.

<sup>6</sup> 1 = Self-sustaining; 2 = Stocked; 2a = Stocked but may become self-sustaining; 3 = Result of downstream drift.

<sup>7</sup> 1 = No immediate management necessary; 2 = Stock at intervals; 3 = No fisheries potential; 4 = Rehabilitate and stock new species; 5 = Stock new species after present fisheries die out; 6 = Stock to establish self-sustaining population; 7 = Let inhabit from upstream source.

## Accessibility

Vehicle access is limited to a county-forest road to East Rosebud Lake. Three trailheads serve the area. The major and most used trail (#15) heads up East Rosebud Creek to Fossil Lake and on to Cooke Pass. Relatively few areas in the Beartooths receive as much traffic as does this scenic area. The logistics of camp spots cause especially heavy use at Elk, Rainbow, and Dewey lakes.

Another maintained trail (#17) follows Armstrong Creek to Froze to Death Plateau and to Mystic Lake. Trail #13 heads eastwardly to Sylvan and Crow lakes. These trails adequately serve the area and cross country travel is easy once above timberline. An unmaintained trail from East Rosebud Lake climbs toward Shadow Lake. Travel here is restricted to foot traffic. Of the 76 lakes, 1 can be reached by vehicle, 22 by horse, 18 have trails nearby, and 58 are not accessible by trail.

## Water Chemistry

According to sampling conducted in the 1970's, most of the lakes range from neutral to slightly acidic with a mean pH of 6.6 and a range of 6.2 to 7.0 (Table 2). Conductivities are all less than 33 mhos. Alkalinities ranged from 5 to 33 ppm  $\text{CaCO}_3$ . The mean for silica was 1.6 ppm and total phosphate averaged .10 ppm for 34 lakes. Waters were usually clear except those at the headwaters of Armstrong Creek and those high lakes along the east side of the drainage. These lakes were typically green with glacial silt.

## Thermal

Surface water temperatures reach their peak about the 25th of August. No lakes exceeded 54° F. East Rosebud Lake had the highest mean number of ice-free days at 199 while many of the high lakes shaded from the sun had 100 days without ice cover. Glacial pools were not common to the drainage.

## Plankton

Considerable study of diets of various fish species indicates that zooplankton communities were of major importance in lakes where ice-cover prevailed. Those lakes with large zooplankton provided better fish growth than lakes without. Large zooplankters were common to the chain of lakes in the upper reaches of East Rosebud Creek and at the head of Armstrong Creek (Table 3). Thirteen of 43 lakes sampled contained one or more of the three large forms common to the drainage. Fossil, Dewey and Lake at Falls were the most productive plankton waters.

Table 2. Chemical attributes of lakes in the East Rosebud Drainage of the Beartooth Mountain Range

Location code <sup>1</sup>	Name of Lake	pH	Conductivity (mhos)	Alkalinity (ppm)	Total hardness (ppm)	Silica (ppm)	Iron (ppm)	Total phosphate (P) t=trace (no units)
1	Crow	6.5		10	10	.7	0	0
2	Sylvan	6.8		30	10	2.9	0	.34
3	East Rosebud	7.0	25	30	17	.8	t	.08
4	Lower Snow	6.6		10	10	3.0	.05	.05
5	Upper Snow	6.8		15	15	2.2	0	.01
6	Elk	6.8	29	15	10	2.1	0	.18
7	Rimrock	6.5	22	10	10	1.7	.18	0
8	Rainbow	6.5	30	10	10	1.6	0	.09
9	Elephant	6.5		10	15	1.2	.15	.05
11	Summit	6.3		10	10	3.0	.10	.05
12	Lake at Falls	6.2	20	12	7	1.5	.14	.02
13	Martin	6.6	15	10	10	.9	0	0
14	Scat	6.5	15	5	5	1.0	.10	.05
18	Boot	6.2	15	10	5	.4	t	.07
19	Big Park	6.6	32	15	15	1.9	0	.05
21	Duggan	6.6	13	10	10	1.3	0	.05
22	Twin Outlets	6.3	10	12	6	1.3	.05	.05
23	Dewey	6.9	13	15	4	1.7	0	.15
25	Fossil	6.6	7	15	3	1.4	0	.21

Table 2. Chemical attributes of lakes in the East Rosebud Drainage of the Beartooth Mountain Range

Location code <sup>1</sup>	Name of Lake	pH	Conductivity (mhos)	Alkalinity (ppm)	Total hardness (ppm)	Silica (ppm)	Iron (ppm)	Total phosphate (P) t=trace (no units)
26	Unnamed	6.5	9	5	5	1.4	0	.05
27	Unnamed	6.7	15	10	10	2.0	.10	.05
28	Oly	6.7		10	10	1.6	.10	.10
30	Billy	6.7		10	5	.9	.05	.05
31	Cairn	6.7		10	10	1.1	.05	.05
33	Medicine	6.7		10	5	1.0	.05	.05
37	Echo	6.5	25	30	10	1.6	.05	.09
41	Lower Arch	6.7	30	20	20		0	.90
44	Shadow	6.5	20	17	7	2.5	.10	.05
45	Lost	6.5	25	33	10	1.5	.05	.07
46	Slough	6.5	30	15	10	2.0	0	0
47	Phantom	6.6	22	10	10	1.8	0	.04
48	Froze to Death	6.4	20	10	10	1.2	.17	.15
49	Turgulse	6.4	49	10	10	1.4	.18	.01
50	Brent	6.4	19	10	10	.9	.17	.04

<sup>1</sup> See Figure 1 for locations.

Table 3. Plankton samples from lakes in the East Rosebud Drainage of the Beartooth Mountain Range.

Location code <sup>1</sup>	Name of lake	Sample date	Volume of plankton cc/m <sup>3</sup>	Number/m <sup>3</sup> of zooplankton	Number/m <sup>3</sup> of large zooplankton	Species of large zooplankton
1	Crow	08/02/77	.12	12		
2	Sylvan	08/24/73	.50	121		
		07/09/73	1.00	90		
		07/10/75	.30	58		
		08/07/75	1.70	24		
		03/20/76	1.30	0		
		08/03/77	.80	554		
3	East Rosebud	07/16/79	.24	3,829		
4	Lower Snow	08/24/77	.26	33		
5	Upper Snow	08/24/77	.26	33		
6	Elk	08/25/77	.41	21		
7	Rimrock	08/25/77	1.50	263		
8	Rainbow	08/25/77	1.50	1529		
9	Elephant	08/24/77	.51	0		
11	Summit	08/24/77	3.00	0		
12	Lake at Falls	08/17/76	9.42	2,312	343	<i>D. middendorffiana</i>
		08/25/77	.16	176		
				-		- <i>D. pulex</i>
13	Martin	08/16/79	.05	383		
14	Scat	08/16/79	.10	48		
15	Little Scat	08/16/79	.05	48		
17	Alice	08/16/79	.05	96		

Table 3. Plankton samples from lakes in the East Rosebud Drainage of the Beartooth Mountain Range.

Location code <sup>1</sup>	Name of lake	Sample date	Volume of plankton cc/m <sup>3</sup>	Number/m <sup>3</sup> of zooplankton	Number/m <sup>3</sup> of large zooplankton	Species of large zooplankton
18	Boot	08/16/79	.05	0		
19	Big Park	08/31/77	7.20	1,245	1,245	<i>D. middendorffiana</i>
21	Duggan	08/31/77	.24	24	24	<i>D. middendorffiana</i>
22	Twin Outlets	08/18/76	.96	0		
		08/31/77	.72	72		
23	Dewey	03/30/76	1.20	200	133	<i>D. middendorffiana</i>
		08/18/76	3.00	100		
		08/31/77	7.20	1,041	72	<i>D. shoshone</i>
					539	<i>D. middendorffiana</i>
				-	-	<i>D. pulex</i>
25	Fossil	03/30/76	.30	120	30	<i>D. shoshone</i>
					30	<i>D. middendorffiana</i>
		08/18/76	4.00	400	200	<i>D. shoshone</i>
		09/01/77	8.00	2,334		
		08/17/79	4.20	3,506	63	<i>D. shoshone</i>
26	Unnamed	09/01/77	.29	0		
27	Unnamed	09/01/77	1.60	267		
28	Oly	09/01/77	.72	24	24	<i>D. middendorffiana</i>
29	Unnamed (6)	08/09/73	-	-	-	<i>D. shoshone</i>
30	Billy	09/01/77	1.90	24	24	<i>D. middendorffiana</i>
31	Cairn	09/01/77	.72	48		
33	Medicine	09/01/77	.17	154		
		08/15/79	5.40	1,364		

Table 3. Plankton samples from lakes in the East Rosebud Drainage of the Beartooth Mountain Range.

Location code <sup>1</sup>	Name of lake	Sample date	Volume of plankton cc/m <sup>3</sup>	Number/m <sup>3</sup> of zooplankton	Number/m <sup>3</sup> of large zooplankton	Species of large zooplankton
37	Echo	08/30/77	.65	0		
		07/13/77	1.40	0		
		08/16/79	.03	0		
41	Lower Arch	08/17/76	.79	0		
		07/18/77	.31	0		
42	Arch	07/24/74	-	-	-	<u>D. shoshone</u>
44	Shadow	08/25/77	2.90	5,361		
45	Lost	08/25/77	1.90	1,268		
		07/14/78	.50	324		
47	Phantom	08/25/77	.86	201		
48	Froze to Death	08/24/77	.72	3,278	48	<u>D. shoshone</u>
		09/12/79	.02	85		
49	Turgulse	08/24/77	.36	108		
			.05	72		<u>D. middendorffiana</u>
50	Brent	08/24/77	.57	29	29	<u>D. shoshone</u>

<sup>1</sup> See Figure 1 for locations.



## Fisheries

At the time this report was written, 26 lakes contained fish (Table 1). Five lakes had reproducing brook trout populations. Sylvan Lake had a reproducing population of pure strain golden trout. Ten lakes had cutthroat trout exclusively, two Snow Lakes had populations of rainbow trout, six lakes contain mixed trout fisheries of cutthroat-golden hybrids and rainbow-golden hybrids. East Rosebud Lake had a coexistence of brown trout, rainbow, cutthroat, white suckers, long-nose suckers, mountain whitefish, and an occasional brook trout (Marcuson 1969, 1970, 1974, 1976). Lost Lake has a mixed population of cutthroat trout and grayling.

Golden trout were the most numerous species in the drainage prior to introduction of cutthroat trout in 1968. Since that time, a large portion of the fishery hybridized. The parent stocks of cutthroat and goldens were rapidly diminishing.

The majority of the lakes (50) were barren of trout. Of the 26 lakes with a fishery, 17 were self-sustaining, 7 must be restocked to maintain a fishery and 2 populations may become self-sustaining. Of the 50 lakes that were fishless, 18 had definite potential and the remaining 32 had no potential.

Table 4 summarizes stocking histories of trout planted by the Montana Department of Fish, Wildlife & Parks. Rainbow trout were first stocked in Rainbow Lake in 1915 by John Branger, Sr., Martin Simmon, Albert Newman, and Mr. Witham. Mr. Jim Annin, Columbus, reported that he caught a 13-inch rainbow at the inlet of Rimrock Lake in 1921. He also thought that Rainbow and Rimrock lakes were stocked in 1909. Dave Bronger, Sr. and Hank Stokie hauled rainbow trout eggs to Snow Lakes sometime in the 1920's. All those interviewed agreed that the rainbow came from the National Fish Hatchery in Bozeman.

It has been reported many times that Froze to Death Lake once had arctic grayling. Records show the plant was made in Phantom Lake; however, it was verified that they were stocked in Froze to Death and Turgulse lakes (Waples per comm.). Grayling were supplied by the State of Montana in 1955 and were stocked as juveniles from an aircraft.

Plants of brook trout were made by Al Croonquist in Crow Lake and by Tommy Garrison in Fossil Lake. Mr. Croonquist brought the fish from a holding area at old Richel Lodge via Lake Mary to Crow Lake. They were planted about 1924 and 1925. Tommy Garrison transplanted his fish from the closest brook trout water sometime after 1970. He may have also introduced brook trout into Cairn Lake. Mr. Annin noted that he recalled brook trout in Slough Lake as early as 1909.

Phantom lake had the only population of cutthroat trout whose origin was somewhat obscure. These fish were most likely planted by the Brangers. The external characteristics of the fish are typical of the Yellowstone variety of cutthroat trout.

Golden trout were first stocked in Sylvan Lake in 1938. Eggs were from Cottonwood Lakes, California and were hatched at and distributed from the National Fish Hatchery in Bozeman. In 1955, eggs were secured from stock at Sylvan Lake and dispersed as 1-inch fish to six lakes in the upper East Rosebud drainage. Some confusion exists between records and locations of some of these plants. The records show no golden trout plants in Fossil Lake which had excellent golden trout fishing in the early 1960's. Golden trout were reportedly stocked in Medicine, Snowbank, Big Park, Dewey, Lake at Falls, and Cairn on 8/29/55. The status of the plants in Medicine, Cairn, and Snowbank were never observed by persons that I interviewed. It was suspected that the golden trout scheduled for Snowbank were in fact put into Fossil Lake and those scheduled for Dewey went to Echo Lake. Table 5 gives the most recent fish species distribution population type, average size, and numbers sampled during our latest surveys on each lake.

A summary of creel census from 1965 to 1978 was conducted by wardens, Marcuson and crew, members of National Outdoor Leadership School, and other selected individuals. The average catch per hour for each fish species was: brook trout, .95; cutthroat trout, 1.43; golden trout, .77; and rainbow x golden hybrids, 1.25. Fly fishermen were most successful at 2.09 fish per hour compared to .82 and .36 for bait and lures, respectively.

During 1988 and 1989 (Poore & Frazer 1990), a voluntary trailhead creel survey was implemented at the major access points to the Absaroka-Beartooth Wilderness Area (A-B). The study showed that in spite of liberal fish limits for the A-B mountains, anglers kept only 26% of their catch in 1988 and 27% in 1989. Anglers released three out of four fish without being required to by restrictive regulations. A-B anglers kept 35% of the brook trout they caught, 24% of rainbows, and 22% of cutthroat. The average catch per hour for each fish species was: 0.94 for cutthroat trout, 0.72 for rainbow trout, and 1.27 for brook trout. Catch rates for 1988 and 1989 were identical with 2.6 fish per hour on lakes, 4.3 fish per hour on streams, and 2.4 fish per hour for people fishing both lakes and streams. By a four to one majority, those anglers responding to the survey wanted to see the present liberal fish limits retained in the A-B.

Table 4. Fish planted by the State of Montana in lakes in the East Rosebud Drainage of the Beartooth Mountain Range.

Location code <sup>1</sup>	Name of lake	Number of fish	Species and strain <sup>2</sup>	Number/acre	Date planted
3	East Rosebud	6,069	RB	54	05/24/90
		9,792-10,000	CT'M	88-90	1986-1989
		600-44,100	LL	5-395	1979-1981
		17,616-51,040	CT	158-457	1971-1976
		2,500-64,563	RB	22-578	1936-1971
		40,000-159,000	CT'Y	358-1,423	1928-1936
4	Lower Snow	6425 eggs	RB	803 eggs	1950's
		?	RB	?	1920's
5	Upper Snow	2,500	RB	240	08/07/89
		2,160	RB	213	08/25/78
		12,850	RB	1,235	06/30/50
7	Rimrock	6,816	RB	203	09/03/48
8	Rainbow	3,500	RB	60	07/24/49
12	Lake at Falls	6,400	GT	128	08/29/55
15	Little Scat	3,840	GT	128	07/27/82
19	Big Park	1,600	GT	205	08/29/55
23	Dewey	3,706	CT'M	99	07/22/85
		3,738	CT'M	99	08/05/81
		10,010	CT'Y	268	07/24/68
		4,800	GT	128	08/29/55

Table 4. Fish planted by the State of Montana in lakes in the East Rosebud Drainage of the Beartooth Mountain Range.

Location code <sup>1</sup>	Name of lake	Number of fish	Species and strain <sup>2</sup>	Number/acre	Date planted
25	Fossil	16,500	CTM	100	08/07/89
		16,446	CTM	100	07/29/86
		16,199	CTM	98	08/02/83
		16,508	CTM	100	08/07/80
		17,000	CTM	103	07/23/77
		5,108	CTY	31	08/09/72
		5,115	CTY	31	09/25/70
		5,000	CTY	30	09/16/70
31	Cairn	10,010	CTY	67	07/24/68
		4,800	GT	32	08/29/55
33	Medicine	2,998	CTM	99	07/22/85
		4,000	CTM	132	08/24/78
		10,020	CTY	330	08/04/71
		6,400	GT	211	08/29/55
37	Echo	7,056	CTY	578	07/30/71
41	Lower Arch Creek Lake	6,240	CTY	257	07/26/71
42	Upper Arch Creek Lake	3,508	CTM	75	08/07/80
43	Arch	650	CTM	100	08/07/89
		654	CTM	100	07/22/85
		650	CTM	100	08/17/77
		12,014	CTY	1,848	08/02/71
45	Lost	500	GR	143	08/18/85
		1,475	CTY	421	07/29/71
47	Phantom	50,000	GR	2,564	07/20/55
		56,672	CTY	2,906	06/14/49

Table 4. Fish planted by the State of Montana in lakes in the East Rosebud Drainage of the Beartooth Mountain Range.

<b>Location code <sup>1</sup></b>	<b>Name of lake</b>	<b>Number of fish</b>	<b>Species and strain <sup>2</sup></b>	<b>Number/acre</b>	<b>Date planted</b>
48	Froze to Death	10,000	CT'M	134	08/24/78
49	Turgulse	10,000	CT'M	121	08/24/78

<sup>1</sup> See Figure 1 for locations.

<sup>2</sup> RB = Rainbow trout; GT = Golden trout; GR = Arctic grayling; CT'Y = Yellowstone cutthroat trout; CT'M = McBride cutthroat trout.

Table 5. Fisheries distribution, average catch/net, average length, population status and latest survey date for lakes located in the East Rosebud Drainage.

Location code <sup>1</sup>	Name of lake	Fish species <sup>2</sup>	Average catch/net	Average length	Sustaining population	Stocked population	Survey date
1	Crow	EB	46	8.6	X		07/13/71
2	Sylvan	GT			X		
3	East Rosebud	RB	.25	9.6	X		
		EB	.25	9.6	X		
		CT	2.50	9.2		X	05/04/90
		LL	6.25	14.2	X		
		WF	2.75	10.1	X		
		LNSU	4.75	15.8	X		
4	Lower Snow	RB	1	18.0		X	08/21/82
5	Upper Snow	RB	15	10.1		X	07/11/81
6	Elk	EB	58	8.0	X		09/01/70
7	Rimrock	RBxGT	6	9.2	X		07/18/85
8	Rainbow	RBxGT	15	10.8	X		08/07/87
12	Lake at Falls	CTxGT	10	9.1	X		08/05/87
		CT	2	15.0	X		08/05/87
19	Big Park	CT	22	8.9	X		07/24/90
22	Twin Outlets	CT	12	11.5	X		08/17/85
		GT	2	11.0	X		08/17/85
		CTxGT	1	11.0	X		08/17/85
23	Dewey	CT	21	9.8	X		07/25/90
24	Snowbank	EB	28	8.2	X		10/01/70

Table 5. Fisheries distribution, average catch/net, average length, population status and latest survey date for lakes located in the East Rosebud Drainage.

Location code <sup>1</sup>	Name of lake	Fish species <sup>2</sup>	Average catch/net	Average length	Sustaining population	Stocked population	Survey date
25	Fossil	CT	32	9.9		X	08/09/89
31	Cairn	EB	5	10.5	X		07/28/87
33	Medicine	CT	8	12.8		X	07/25/90
37	Echo	CT	12	13.7	X		08/05/87
41	Lower Arch Creek Lake	CT	14	9.9	X		08/08/87
42	Upper Arch Creek Lake	CT	39	11.1		X	08/08/87
43	Arch	CT	10	14.0		X	08/09/87
44	Shadow	CT	3	14.2	X		07/20/90
45	Lost	CT	0		X		08/17/90
		GR	0			X	08/17/90
47	Phantom	CT	14	11.4	X		07/24/86
48	Froze to Death	CT	60	10.7	X		07/17/90
49	Turgulse	CT	14	13.6		X	07/25/86

<sup>1</sup> See Figure 1 for locations.

<sup>2</sup> RB = Rainbow trout; LL = Brown trout; EB = Brook trout; CT = Cutthroat trout; MF = Mountain whitefish; GT = Golden trout; LNSU = Longnose sucker.

## Management Recommendations for Lakes in East Rosebud Creek Drainage

Six of 76 lakes are scheduled for periodic introductions of cutthroat trout (Table 6). Recent surveys indicated limited reproduction was occurring in Fossil, Upper Arch, and Turgulse lakes, but was probably not sufficient to maintain the fishery. These lakes need additional evaluation of their spawning potential. The 1990 survey on Dewey Lake indicates the population is self-sustaining, so the scheduled 1991 plant will be discontinued. Limited reproduction of cutthroat from one-time introductions into Lost and Echo lakes in 1971 are maintaining those populations at low levels.

Attempts to establish a self-sustaining McBride cutthroat fishery in East Rosebud Lake have failed. McBride cutthroat from four years of plants have all shown poor growth and survival. In addition, no evidence of natural reproduction or spawning fish have been found. The pattern of effective cropping of sub-adult fish of all species by a well established brown trout population is a dominating influence. DeSmet strain rainbow trout were introduced during May 1990 and are also scheduled for 1991 and 1992.

Lost lake appeared to be best suited for arctic grayling. The general morphology, inlet and food grade, were typical of habitats in the Beartooths where grayling were successful (Marcuson 1974). Lost Lake's outlet drains into waters that are unlikely to be influenced by immigration of grayling. A gradient of 760 feet in less than 1 mile occurs between Lost and Shadow lakes. A gradient of this magnitude would most likely kill any fish unfortunate enough to be there. Regardless, the presence of grayling in downstream waters would produce no known detriment to existing fisheries. Grayling were introduced in 1985 and another plant is scheduled as soon as they are available.

Golden trout are recommended for Scat Lake and are intended to stock the chain of lakes downstream on Falls Creek (Figure 3). Goldens introduced into Little Scat in 1982 disappeared, but another plant is scheduled for 1991 and 1992. Echo Lake is also an ideal golden trout environment, but cutthroat trout originating from a 1970 plant inhabit the lake. This cutthroat population would have to be eliminated prior to any introduction of golden trout into Echo Lake. Recommendations for management of golden trout are based on research findings conducted on golden trout in Sylvan and Lightning lakes (Marcuson and Bishop 1971, 1973, 1975).

Fifty of the 76 lakes are fishless of which 17 were recognized as having fisheries potential. Management proposed in this plan involves 5 of these 17 waters with potential. Over half the lakes in the drainage (45) should retain fishless status typical of Wilderness waters (Marcuson 1976).

Part of each management plan involves the goal of producing some trophy type fisheries, distributed in such a fashion as to help distribute people. Regardless of the distribution goal, the right combination of features need to be present to create large fish. Trophy fish are easier to achieve by stocking than manipulating a self-sustaining fishery. Unless mortality rates are high or reproduction is limited, the perpetuating fish populations usually become overpopulated in these mountains. The best big fish producer of the self-sustaining fisheries is Lake at Falls. Of those



Table 6. Fish stocking proposed for lakes in the East Rosebud Drainage of the Beartooth Mountains.

<b>Location code<sup>1</sup></b>	<b>Name of lake</b>	<b>Next stocking year</b>	<b>Stocking frequency</b>	<b>Fish species<sup>2</sup></b>	<b>Number of fish</b>	<b>Number of fish/acre</b>	<b>Comments</b>
3	East Rosebud	1991	1	RB	6,000	54	
5	Upper Snow Lake	1997	8	RB	2,500	240	Evaluate 1989 plant
14	Scat	when available	0	GT	3,840	128	
23	Dewey	1991	6	CT'M	3,720	100	
25	Fossil	1992	3	CT'M	10,000	60	
33	Medicine	1991	8	CT'M	3,030	100	
42	Upper Arch Creek Lake	1991	8	CT'M	3,500	75	Determine if self-sustaining
43	Arch	1997	8	CT'M	650	100	
45	Lost	when available	0	GR	500	143	
49	Turgulse	1991	8	CT'M	10,000	120	Determine if self-sustaining

<sup>1</sup> See Figure 1 for locations.

<sup>2</sup> O = Plant on one time basis

<sup>3</sup> GT = Golden trout; GR = Arctic grayling; CT'M = McBride cutthroat trout; RB = Rainbow trout.

lakes stocked with cutthroat trout that have trophy producing characteristics, Fossil, Dewey, and Froze to Death have the best credentials. Opportunity is less controllable at Dewey Lake due to the potential of immigration of fish from Fossil and Cairn lakes. Cairn lake produces some trophy brook trout.

Possibly the biggest concern to the welfare of fisheries in the drainage is the presence of brook trout in Cairn and Crow lakes. Cairn presents the threat of downstream dispersement and Crow provides a possible transplant source too close to Sylvan Lake, a pure strain golden trout population. Study of brook trout in Beartooth waters demonstrated this fish's ability to eventually become the sole species in environments where they can reproduce. Transplants are not as common as they were in the past, but they can have tremendous impacts on an area. This plan attempts to discourage unwanted and unauthorized transplants by providing planned fisheries in areas where individuals may take stocking responsibilities upon themselves. It also promotes slight increases in the number of waters containing certain fish species of special concern. It also discourages aerial stocking of waters in close proximity to these special fisheries to minimize potential stocking errors. To date, no brook trout have been found in Sylvan Lake.

The brook trout threat in Cairn must be monitored closely and examined to determine possibilities of eradication or the feasibility of construction a downstream barrier. During July 1990 netting surveys in Dewey Lake, located several miles downstream from Cairn Lake, no brook trout were found. Billy Lake, located just downstream from Cairn, should be checked for brook trout.

At present, the only significant stream fishery is East Rosebud Creek. This stream contains a variety of fish species. Many of the subdrainages have fish near the inlet and outlets of lakes. Most of the streams have high gradients and little fish habitat (Marcuson 1976a).

Implementation of more restrictive regulations throughout the entire A-B Wilderness at this time is not warranted because: 1) Use is restricted by difficult access and the large number of lakes containing fisheries. Maintained trails lead to less than half the lakes with fish. 2) Many A-B lakes need more harvest because they contain overabundant populations of brook trout and (in some lakes) Yellowstone cutthroat. 3) Unlike most wilderness lakes many A-B lakes are uniquely fertile and productive. Even with liberal limits, optimum harvest has not been reached. 4) Our trailhead creel survey indicates people are regulating their own harvest and prefer this to being required to follow unnecessarily stringent regulations.

Several areas along major trails (especially where horses are allowed) are showing signs of overuse and may require some type of special management. Most A-B wilderness users, however, are satisfied with present management and the resource is in excellent shape.

## REFERENCES

- Marcuson, P.E. 1969. Inventory of waters of the Project Area. D-J Job Prog. Report F-20-R-13, MT Department of Fish and Game, 10 pp.
- Marcuson, P.E. and C.G. Bishop. 1970. Inventory of waters of the Project Area. D-J Job Prog. Report F-20-R-14, MT Department of Fish and Game, 12 pp.
- \_\_\_\_\_. 1971. Inventory of waters of the Project Area. D-J Job Prog. Report F-20-R-15, MT Department of Fish and Game, 11 pp.
- \_\_\_\_\_. 1973. Inventory of waters of the Project Area. D-J Job Prog. Report F-20-R-16, MT Department of Fish and Game, 11 pp.
- \_\_\_\_\_. 1974. Inventory of waters of the Project Area. D-J Job Prog. Report F-20-R-17 & 18, MT Department of Fish and Game, 11 pp.
- Marcuson, P.E. 1974. Beartooth Grayling Study. D-J Job Prog. Report F-20-R-18, MT Department of Fish and Game, 18 pp.
- Marcuson, P.E. and C.G. Bishop. 1975. Inventory of waters of the Project Area. D-J Job Prog. Report F-20-R-19, MT Department of Fish and Game, 21 pp.
- \_\_\_\_\_. 1976. Inventory of waters of the Project Area. D-J Job Prog. Report F-20-R-20, MT Department of Fish and Game, 24 pp.
- Marcuson, P.E. 1976. Wilderness Area Fisheries. Trans. Amer. Fish. Soc. Spec. Pub. Management of Wilderness Area Waters, 23 pp.
- \_\_\_\_\_. 1976a. Beartooth Face Stream Inventory. D-J Job Prog. Report F-20-R-21, MT Department of Fish and Game, 67 pp.
- Poore, M.D. and K. Frazer. South Central Montana Coldwater Fisheries Investigations. D-J Job Prog. Report, Project F-46-R-3, Job V-b, MT Department of Fish, Wildlife and Parks, 32 pp.